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Filed: March 29, 2004	:	Examiner:

For: METHOD OF AUTHENTICATING A LOG-ON REQUEST AND RELATED APPARATUS

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Sir:

At the time the above application was filed, priority was claimed based on the following application(s):

Great Britain Application No. 0307303.8, filed March 29, 2003.

A copy of the priority application is enclosed.

Respectfully submitted,

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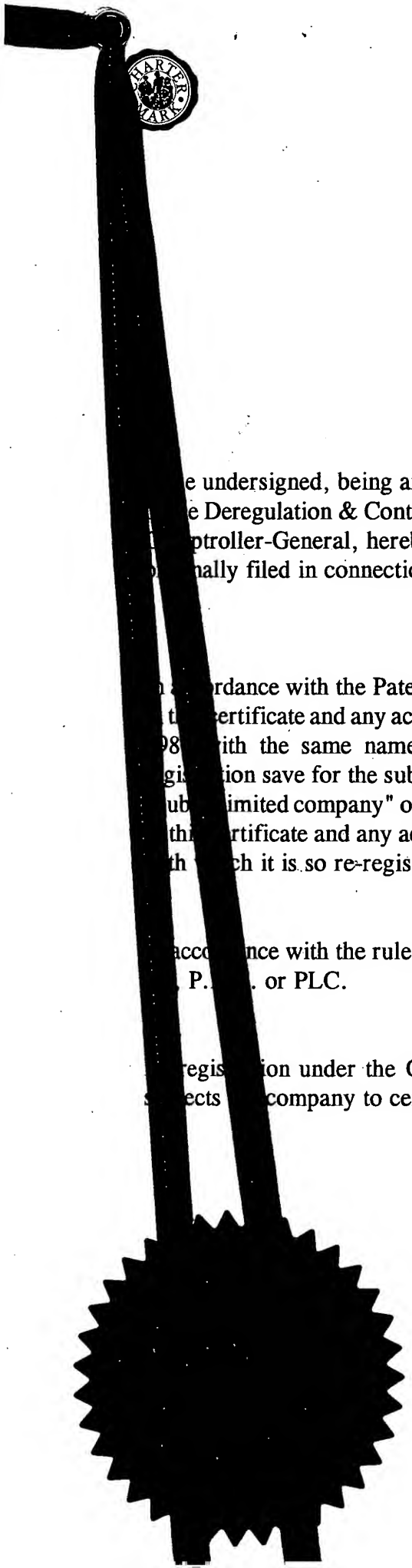

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Signature Date

Bruce Graeme Roland Jones 27 March 03

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1. Your reference — 300200903-1 GB

2. Patent application number *(The Patent Office will fill in this part)* — 0307303.8 — 29 MAR 2003

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Hewlett-Packard Development Company, L.P.
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Houston, TX 77070
USA

Patents ADP number *(if you know it)* 8557886001

If the applicant is a corporate body, give the country/state of its incorporation — Texas - USA

4. Title of the invention — Method of Authenticating a Log-on Request and Related Apparatus

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Hewlett-Packard Ltd, IP Section
Filton Road, Stoke Gifford
BRISTOL BS34 8QZ

Patents ADP number *(if you know it)* 7563083001

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

Yes

METHOD OF AUTHENTICATING A LOG-ON REQUEST AND RELATED APPARATUS

This invention relates to a method and related apparatus for authenticating a log-on to an application.

When logging onto an application running on a processing apparatus it is generally desirable to perform an authentication process to ensure that the user/machine that is trying to log-onto the application is genuine. Such an authentication tries to ensure that the application is not being accessed fraudulently. Of course, as the importance of the data that can be accessed by logging on to the application increases the desirability of providing a strong authentication increases so that it becomes harder to fraudulently access data via the application.

With the use of the Internet increasing a large amount of highly sensitive data (for example bank account details, medical records, and the like) is becoming more commonly accessible across the Internet via applications that may be connected to the Internet. As such the importance of providing robust authentication is increasing.

In prior art systems a user generally requests a log-on to the application by specifying an account that is associated with that user via a means such as a User Identity (USERID), which provides a unique identity for that account on that application. The user is then prompted for one or more passwords to verify his/her identity so that access can be granted to the application. These passwords may take the form of answers to questions which have previously been posed to the user; for example the maiden name of his/her mother; the name of their first school. Further, the password may have to meet a predetermined format that contains one or

more numeric characters and/or symbols to try and increase the strength of the password (i.e. make it harder to crack).

According to a first aspect of the invention there is provided a method of establishing access from a first processing apparatus to an application running on a second processing apparatus comprising the steps of: sending, on behalf of the first processing apparatus, a log-on request to the second processing apparatus via a first network; responding to the log-on request with a demand for authentication data; and replying to the demand by sending the authentication data; wherein at least one of the demand and the authentication data are sent via a second network, different to the first.

The use of the second network is advantageous because it may increase the security of the method; it is unlikely, and technologically much harder, to intercept a communication that is passed via the second network. This arises because the communication sent over the second network would generally be unrelated to communications sent over the first network and as such it should be harder to intercept communications on both the first and second networks: making the method more secure than prior art methods.

It is advantageous if the second network comprises a packet switched network, because such a network provides greater flexibility in the connection between the local processing apparatus and the processing apparatus. Indeed, using a packet switched network in this manner may allow the one or both of the response to the request and the response to the response to be transmitted via a plurality of networks rather than a single network.

Using a plurality of networks may be advantageous because it adds greater flexibility to how the response to the request and the response to the response can be sent to the local processing apparatus. For example, should the local processing apparatus comprise a desktop computer it is likely that an email connection will be available, but it may perhaps be unlikely that a telephone network connection thereto will be available. Therefore, the response to the request sent to the local processing may be sent from the processing apparatus via a telephone network, perhaps via an MMS message. Since, in this example, the local processing apparatus does not have a connection to the telephone network it will not be capable of receiving this message. Therefore, the message may be directed to the service provider to which the local processing apparatus connects and is converted to an email that is then forwarded to the local processing apparatus. Therefore, this response to the response will be transmitted via two different networks: the telephone network, and the network linking the local processing apparatus to its service provider. However, the response to the response is still likely to be secure and difficult to intercept since it will have been transmitted via the telephone network for the majority of its path. It may harder to intercept a communication sent from the server of the service provider to the local processing apparatus than a communication sent across a network such as the Internet at large. It will be appreciated that an MMS message can be sent to an email address.

Generally, the request will be sent on the first network. Further, both of the demand and reply may be sent over the second network. Such an arrangement is advantageous, especially if the second network is more secure than the first, since it will be harder to intercept the data-requested to authenticate the log-on.

The term unsecure network is intended to cover networks in which data is at risk from third parties. For example, the data may be intercepted, accessed on a server without authorisation, obtained following a confidence trick (such by sending apparently valid emails requesting responses giving away account details and the like) or any other means in which the data is obtained undesirably by a third party. In particular the first, unsecure, network may comprise the Internet.

The second network may comprise a wireless telephone network. For example the second network may comprise any of the following (which is not intended to be exhaustive) a UMTS network, a GPRS network, a GSM network.

Conveniently, communications sent across the second network may comprise MMS messages. Such messages are advantageous because they may comprise data according to a plurality of different formats and as such may provide a stronger authentication than prior art systems. It is conceivable that messages sent over the second network could comprise any other format. For example the communications may comprise SMS messages. Such SMS messages are of course much shorter than MMS messages and therefore may not be capable of providing as strong an authentication as an MMS message.

The local processing apparatus may be any apparatus capable of establishing a connection (a connection over which data can be exchanged) with a processing apparatus. The skilled person will appreciate that the number of types of such apparatus is increasing and currently includes any of the following non-exhaustive list: PDA's, telephones (both mobile and fixed line), laptop computers, notebook computers, watches, desktop computers, televisions, and the like.

According to a second aspect of the invention there is provided a system comprising at least a first processing apparatus which is capable of being connected, by a first network and a second network connection, to at least one second processing apparatus running an application to which access is gained from the first processing apparatus, the system being arranged to allow the first processing apparatus to initiate a log-on to the application by sending a log on request to the application on the second processing apparatus, the second processing apparatus being arranged to generate a demand for authentication data in response to the request and transmit the demand to the first processing apparatus and the first processing apparatus being arranged to transmit a reply to the demand including the authentication data to the second apparatus; wherein the system is arranged such that at least one of the log-on request, the demand and the reply to the demand are sent via the second network.

According to a third aspect of the invention there is provided processing apparatus running an application onto which users can log-on and comprising a first transmitting means and a first receiving means arranged respectively to transmit and receive data across a first network, a second transmitting means and a second receiving means arranged respectively to transmit and receive data across a second network, different from the first network, and a processing means, at least one of the receiving means being arranged to receive a request to log-on to the application and pass the request to the processing means, the processing means being arranged to cause at least one of the transmitting means to transmit a demand for authentication data and at least one of the receiving means being arranged to receive a reply to the demand which is arranged to forward the reply to the processing means which is arranged to determine whether the authentication data has been supplied in the reply and to authenticate the log-on request accordingly; wherein at least one of the request, the demand and the response are sent using the second network.

Such an apparatus may comprise a server, or the like, running an application to which computers, or other processing apparatus, remotely log-on. In its broadest aspect the apparatus may comprise any form of computing apparatus, running an application, on to which a user may wish to remotely log-on.

According to a fourth aspect of the invention there is provided a method of establishing access from a first processing apparatus to an application running on a second processing apparatus wherein the second apparatus is capable of being connected to a first network and a second network, the method comprising receiving a request to log-on to the application from at least one of the first and second networks, sending a demand for authentication data via at least one of the first and second networks and receiving a reply to the demand containing the authentication data, via at least one of the first and second networks, and processing the authentication data to determine whether it is the demanded authentication data and authenticating the log-on request accordingly; wherein at least one of the request, the demand, and the reply are transmitted using the second network.

According to a fifth aspect of the invention there is provided a processing apparatus arranged to generate a request to initiate a log-on with an application capable of being connected thereto via at least a first and a second network wherein the apparatus is arranged to generate a log-on request and transmit the request across at least one of the first and second networks, further arranged to receive a demand for authentication data in response to the request from at least one of the first and second networks, further arranged to process the demand and to generate a reply thereto containing the authentication data and further arranged to send the reply across at least one of the first and second networks; wherein the apparatus

is arranged such that at least one of the request, the demand, and the reply are transmitted using the second network.

The skilled person will appreciate that the number of types of such apparatus is increasing and currently includes any of the following non-exhaustive list: PDA's, telephones (both mobile and fixed line), laptop computers, notebook computers, watches, desktop computers, televisions, and the like. Each of these devices is capable of allowing a user to log-on to an application running on a processing apparatus.

According to a sixth aspect of the invention there is provided a method of establishing access to an application running on a processing apparatus from a first processing apparatus and capable of being connected to the application by a first and a second networks comprising generating a request to log-on to the application and transmitting the request across at least one of the networks; receiving a demand for authentication data in response to the request from at least one of the first and second networks ; generating a reply to the demand including the authentication data and sending the reply across at least one of the first and second networks; wherein at least one of the request, the demand and the reply are transmitted using the second network.

According to a seventh aspect of the invention there is provided a method of authenticating a log-on to an application running on a processing apparatus comprising causing the processing apparatus to send a demand for authentication data to a second processing apparatus and further requiring receipt of the authentication data from one of the processing apparatus and the second processing apparatus; and if the authentication data meets predetermined criteria authenticating the log-on to the processing apparatus.

According to an eighth aspect of the invention there is provided a method of establishing access to an application running on a processing apparatus comprising the following steps:

i. making an access request to an access requesting means for receiving and processing the access request;

ii. causing the access requesting means to process the request and cause a demand for authentication data to be generated requesting predetermined authentication data and to be sent to a verifying means for receiving the demand and allow a user thereof to verify the request;

iii. causing the verifying means to send a reply to the demand containing information; and

iv. receiving and processing the reply and determining whether the request to access the processing means should be granted by determining whether the data contained in the reply is, or substantially is, the authentication data.

According to a ninth aspect of the invention there is provided a computer readable medium containing instructions which when read onto a computer cause that processing apparatus to perform the method of any one of the first, fourth sixth, seventh or eighth aspects of the invention.

According to an tenth aspect of the invention there is provided a computer readable medium containing instructions which when read onto a computer cause that computer to function as the processing apparatus of the second, third or fifth aspects of the invention.

The computer readable medium of any of the seventh, eighth or ninth aspects of the invention may comprise any of the following: a floppy disk, a hard drive, a CD ROM (including RW), a DVD ROM/RAM (including +RW/-RW), any form of magneto/optical storage, magnetic tape, memory, a transmitted signal (including an Internet file transfer, ftp, or the like), a wire, or any other suitable medium.

There now follows by way of example only a detailed description of the present invention with reference to the accompanying drawings in which:

Figure 1 schematically shows a remote processing apparatus, such as a server, used in embodiments of the invention;

Figure 2 schematically shows the communications used in embodiments of the present invention;

Figure 3 shows a number of potential local processing apparatus that may be used to access a remote processing apparatus;

Figure 4 schematically shows a further embodiment of the system used in relation to this invention;

Figure 5 shows a flow chart for a first embodiment of the invention;

Figure 6 shows a flow chart for a second embodiment of the invention; and

Figure 7 shows a further embodiment of the invention.

Some embodiments of this invention allow access to a remote processing apparatus across a network, although there are other aspects as discussed below. An example of such an processing apparatus (in this example, a server 100) is shown in Figure 1 and comprises a display 104, processing circuitry 106, a keyboard 108, and mouse 110. The processing circuitry 106 further comprises a processing means 112, a hard drive 114, a video driver 116, memory 118 (RAM and ROM) and an I/O subsystem 120 which all communicate with one another, as is known in the art, via a system bus 122. The processing means 112 typically comprises at least one INTEL™ PENTIUM™ series processor, running at generally between 2GHz and 2.8GHz (although it is of course possible for other processors to be used). The remote processing apparatus may of course be any other type of computer and could for example be a mainframe computer; a mini-computer; a micro-computer; or any other suitable processing apparatus including any computer or computer system.

As is known in the art the ROM portion of the memory 118 contains the Basic Input Output System (BIOS) that controls basic hardware functionality. The RAM portion of memory 118 is a volatile memory used to hold instructions that are being executed, such as program code, etc. The hard drive 114 is used as mass storage for programs and other data.

Other devices such as CDROMS, DVD ROMS, network cards, etc. could be coupled to the system bus 122 and allow for storage of data, communication with other computers over a network, etc.

The server 100 further comprises a first transmitting/receiving means 124 which is arranged to allow the server 100 to communicate using the Internet 6 (which provides a first, unsecure, network). The first transmitting/receiving means 124 also communicates with the processing

means 112 via the bus 122. A second transmitting/receiving means 126 is also provided which is capable of communicating with a second network 304, as will be described hereinafter.

Although, in this embodiment, the first and second transmitting/receiving means 124,126 connect to different networks, this need not be the case. Indeed, the first and/or second transmitting and/or receiving means may be any one of the following: a MODEM; a Network Interface Card (NIC) (whether as a separate card, or as integrated into a processing apparatus); any form of interface to a wired or wireless network; a GSM, a GPRS, a UMTS, or any other form of telephone network, connection, or the like.

The server 100 could have the architecture known as a PC, originally based on the IBM™ specification, but could equally have other architectures. The server may be an APPLE™, or may be a RISC system, and may run a variety of operating systems (perhaps HP-UX, LINUX, UNIX, MICROSOFT™ NT, AIX™, or the like).

As can be seen from Figure 2 a local processing apparatus 300 is provided, capable of communicating with the remote processing apparatus 100 and which in this embodiment may provide a verifying means and an access requesting means. In the embodiment shown the local processing apparatus is a PDA, such as a COMPAQ iPAQ™ equipped with a UMTS connection capability and a WIFI (IEEE 802.11) connection capability, which connects the iPAQ™ 300 to a local server 302 via the wireless link 304. However, as described later the local processing apparatus could be a number of other devices. The local server 302 provides access to the Internet 6 as is known in the art.

As the skilled person will appreciate the Compaq™ iPAQ™ operates using the Microsoft™ PocketPC™ operating system, and runs Microsoft™

Pocket Explorer as its means of communicating with the server 100 across the Internet 6 (in conjunction with the World Wide Web). The iPAQ™ has a virtual keyboard, provided via touch screen input, and can access the web, etc. using MODEM, or network cards connected through a PC card slot, via its infrared link, or Bluetooth™ links. However, in this embodiment access to the Internet is provided by the WIFI link 304.

The iPAQ™ is also capable of receiving communications via the UMTS (sometimes referred to as 3G) connection. The UMTS connection is represented, in the Figure, by the transmitter/receiver 306 together with the cloud 308 representing the transmitted signal. Thus, the PDA 300 is capable of receiving communications from external sources using two, unrelated, communication networks. Other wireless telephony networks such as for example GPRS, GSM, connections are equally possible to connect the iPAQ™ 300.

The skilled person will appreciate the existence of the MMS (Multi-media Messaging Service) protocol which is capable of transmitting messages containing data representing any form of multi-media. For example the data transmitted by an MMS message may represent graphics, audio samples, images, video clips, streamed data, allow synchronised presentations to take place and the like. Indeed, the initial specification of MMS has been defined to work with the following data-formats:

image:	JPEG, GIF 89a, WBMP
video:	ITU-T, H.263, MPEG 4 simple profile
audio:	MP3, MIDI, WAV, AMR/EFR-for voice.

This embodiment provides a method of logging on to a network, remote application, remote computer, a processing apparatus or any other similar circumstances and will be described, in this embodiment, in relation to logging on to an application running on the server 100. Generally, even

when logging onto an apparatus it is software (i.e. an application) that handles the log-on process rather than hardware.

As the skilled person will appreciate the iPAQ™ 300 will already have a connection 304 to the local server 302 (which may also be established using the teachings of this invention) to allow access to the Internet 6.

The iPAQ™ 300 can also communicate with the remote apparatus, or server 100, via a UMTS based communication via the transmitter/receiver 306, which provides the UMTS cell 308 with which the iPAQ™ 300 communicates, which together provide a UMTS connection 310. The use of MMS messages across the UMTS connection 310 may be particularly convenient for embodiments described herein.

The server 100 can be accessed across the Internet 6 by the iPAQ™ 300 by a user of the iPAQ™ 300 entering the appropriate URL to specify the remote apparatus (the remote server 100). Data packets will then be routed across the Internet 6 and delivered to the remote server 100. Before access is granted to the remote server 100, the identity of the iPAQ™ 300/user thereof should be established and this is achieved using an authentication process.

Historically, such authentication has relied on assigning a password to a user identity (USERID) that a local apparatus such as the iPAQ™ 300 supplies in order to gain access to the remote server 100. The access granted to the iPAQ™ 300 will be determined by the privileges granted to that particular USERID.

In the embodiment being described in relation to Figures 3 and 6 authentication relies a communication across the UMTS connection 310

and proceeds as follows: the user of the iPAQ™ 300 enters the URL of the remote server 100 and makes a request to log-on to a predetermined account defined by a USERID 500. This log-on request may be thought of as an access request made by an access requesting means. Data packets containing the request to log-on to the account are routed to the remote server 100, which is running the application to which it is desired to log-on to. The server 100 acknowledges 502 the data packets across the Internet 6 and specifies that an MMS message will be sent to the iPAQ™ 300 via the UMTS connection 310.

The remote server 100 then generates the MMS message and sends 504 it across the UMTS connection 310. As will be described herein after the MMS message can contain many different mechanisms for identifying the identity of the iPAQ™ 300/user thereof. This MMS message may be thought of as a demand for authentication data, since it will contain a request for such data.

Once the iPAQ™ 300 receives the MMS message (demand for authentication data), the iPAQ™ 300/user thereof sends 506 data that has been requested by the remote server 100 in its MMS message to the iPAQ™ 300 in a reply to the demand via an MMS message back to the remote server 100 using the UMTS connection 310. For example, in this embodiment the response MMS message from the remote server 100 asks for a signature of the user to be provided. The user therefore signs the screen of the iPAQ™ 300 so that this can be returned to the remote server 100.

The remoter server 100 receives the reply MMS message, which includes the signature of the user, from the iPAQ™ 300 and checks 508 that information contained therein does indeed verify the identity of the iPAQ™ 300/user thereof; i.e. the information contained in the MMS

message is correct. If the information contained in the MMS message is correct then the authentication is complete and the iPAQ™ 300/user thereof is allowed access 510 to the account that it/he/she was trying to access.

The accuracy of the information contained in the reply MMS message is checked using known techniques for verifying that particular format of data item. For example a known signature checking algorithm is used to check the validity of a signature against a pre-stored signature for that particular user.

In some embodiments the user is asked to attach a predetermined data item rather than being asked to create a new data item. For example, the user may be asked to return one of a plurality of data items that are stored in a memory to which the local processing apparatus has access. In such embodiments it may be a requirement that the data item returned in the response message is identical to the one requested by the remote server 100.

As discussed above, the MMS message can contain a large number of different data types/formats. It is therefore, possible for the remote server 100 to request from the iPAQ™ 300/user thereof a specified data item. For example, the remote server 100 may specify that the iPAQ™ 300/user thereof should send a specified video clip, sound clip, picture, signature, finger print, or the like.

The data sent in the MMS message could be hashed using known hashing techniques, which may increase the security of the communication further. For example, the MMS may include a picture which has been hashed using a known algorithm using a private key as the seed of that

algorithm. The picture may then be unhashed using a public key corresponding to the private key used to hash the picture.

The length of the key may be tailored to the device to which it is being sent. It will be appreciated from Figure 3 that messages could be sent to/received from a variety of different devices. The processing power of these devices is likely to vary from one to another and devices having a lower processing power may not be able to process long keys.

The data item may be maintained in a memory accessible to the iPAQ™ 300/user thereof, or alternatively and perhaps more preferably may be created by the iPAQ™ 300/user thereof in order to send the response MMS message. For example, the user of the iPAQ™ 300 may sign the screen of the device to generate a data item comprising a signature that is sent in the response message to the remoter server 100.

In likewise manners sound input means (generally a microphone, or the like) of the iPAQ™ 300 may be used to record a sound clip (for example, the user speaking) in order to verify the identity of the user.

It will be appreciated that mobile telephones exist that allow a user to take a picture and/or a video clip as a data item and subsequently transmit that data item via an MMS message. Similarly, the remote server 100 could request in the MMS message to the iPAQ™ 300 that a video clip/picture of a predetermined object. It would also be possible for other devices to generate/capture pictures and/or video clips.

In some embodiments the predetermined object may be something that determines the location of the iPAQ™ 300/user thereof. Such an arrangement may be useful in situations in which the location of the user is to be used to provide location based services, or may be useful to

provide an authentication if the location of the iPAQ™ 300/user thereof is known. It is known to fit GPRS modules to mobile devices such as an iPAQ™ 300, which may be used to provide location information.

In this embodiment, and as represented by Figure 3, the local device 300 need not be a PDA and could be any form of device capable for communicating with the remote server 100 via a first network 400 and a second network 402. A possible list of such devices, which is not intended to be exhaustive, includes: a telephone (show as a mobile telephone in the Figure, but not necessarily so) 404; a notebook computer and/or PDA with keyboard 406; a computer such as a PC, apple, or the like 408; a television 410. Generally, and as represented in the Figure such devices may connect through a local server 412 in order that access is provided to one or more of the networks, such as the Internet 6, and in the Figure access is provided to the first network via the local server 412.

The system may be arranged such that the iPAQ™ 300 is arranged to periodically send an MMS message via the UMTS connection 310 to re-authenticate the log-on to the application running on the remote server 100. Such an arrangement can help to keep the connection secure and may help identify situations in which the connection has been compromised by a third party.

The system shown in Figure 2 may comprise a RADIUS (Remote Authentication for Dial in User Service) server and such an arrangement may as seen if Figure 4. It will be appreciated that a RADIUS server is a sub set of an Authentication Authorisation Accounting (AAA) server, which are likely to become more common as wireless telephone networks migrate to 3G technology. As can be seen from Figure 4 the server 302 to which the iPAQ™ 300 connects may be an AAA server and this server

may connect to an authentication server 312. It will be appreciated that there are many other possible network topologies that may be used.

A flow chart for the process described above can be seen in Figure 5 in which a log-on request has been made to log-on to a service is made 400. In response to this request to log-on to the service, a demand for authentication data is sent via a second network, in particular but not exclusively, as an MMS message 402. This demand contains a request for predetermined authentication data that is intended to provide a "strong" authentication of the user's/machine's identity that is making the request. A reply is returned to the demand containing the data that was requested in the demand for data 404. The correctness of the information returned in the reply is checked 406 and if the information is correct then the log-on is complete following a successful authentication of the user's/machine's identity 408.

Although the above embodiments describe the second network as comprising a UMTS connection it could of course be any network capable of connecting the remote and local processing apparatus. It is convenient if the second network is a wireless network such as UMTS, GPRS, or the like, since this may increase the security of the messages. However, this need not be the case. It is known for users to hold accounts with different Internet Service Providers (ISP's) and some embodiments of the invention may send the request and response messages across the same infrastructure (e.g. the Internet), but using a different ISP and so provide two different networks.

Further, it will be appreciated that the above embodiments talk about a first and a second network. It would of course be possible to for a communication (whether a log-on request, a demand, or a reply) to be sent via a plurality of different networks. For example, the demand for

authentication data may be sent to via a MMS message which is subsequently converted into an email for a portion of its journey. The skilled person will appreciate that an MMS message can be sent to an email address.

At least some of the advantages of the invention may be provided by the provision of a network connection which includes, or is predominately, a wireless connection, and in particular a wireless telephone connection. Further, the message may exist in another format before being converted into an MMS, or other format, for transmission.

In a broad aspect the invention may be considered as using a communication over a second network to authenticate a log-on over a first network. Or indeed, similar methods may be applicable to allow a user to directly login to a processing apparatus (i.e. not over a network connection) and such an arrangement is shown in Figure 7. In such embodiments once a login request has been made to the processing apparatus a communication is subsequently sent over a network to verify the identity of the user much in the same way as the communication is sent over the at least one second network in the above described embodiments. It will be seen that (and unlike in the embodiments described to date) that the access requesting means and the verifying means are provided by different devices in the embodiment described in relation to Figure 7.

For example, a user attempting to log-on to an application running on a computer 700 providing an access requesting means, or other processing apparatus, by making an access request thereto may be sent a demand for authentication data to a device 708 separate to the computer 700 running the application on to which he/she is trying to log. The device 708

separate to the computer may be thought of as a proxy which is used to authenticate the log-on request.

In a specific example, a user may try and log-on to an application running on a PC 700. The PC 700 may cause a message, which may be an MMS message, to be sent to his/her mobile phone 708 demanding authentication data and as such, the mobile telephone 708 may provide a verifying means. The user may then respond to the MMS message either by replying on his/her telephone 708, or by inputting his/her reply onto the PC 700 in order to validate his/her log-in.

For the avoidance of doubt, in this embodiment the PC 700 connects to a local server 702 (which may be an AAA server) in order to access the Internet 6 and consequently gain access to a remote server 100. The remote server 100 is capable of generating an MMS (or other message) via a transmitter 704 and a communication medium 706 to the telephone 708. It will be appreciated that the PC 700 could communicate with a remote server 100 with a medium other than the Internet 6 and could for instance send a communication such as an MMS message. The invention may be thought of as using an MMS message to authenticate a request to log-on to an application.

The access requesting means may be any processing apparatus capable of having an access request made thereto. Further, the verifying means may be any processing apparatus capable of verifying a log-on request. The access requesting means and the verifying means may be provided by different processing apparatus, or maybe by the same apparatus. Possible examples of access requesting means and/or a verifying means include any of the following: a computer (whether desktop, laptop, handheld, server, etc.), a PDA, a telephone, a television, a watch, or any other device capable of communicating over a network.

CLAIMS

1. A method of establishing access from a first processing apparatus to an application running on a second processing apparatus comprising the steps of: sending, on behalf of the first processing apparatus, a log-on request to the second processing apparatus via a first network; responding to the log-on request with a demand for authentication data; and replying to the demand by sending the authentication data; wherein at least one of the demand and the authentication data are sent via a second network, different to the first.

2. A method according to claim 1 in which the demand and the authentication data is sent via the second network.

3. A method according to claim 1 or 2 in which the demand and/or the authentication data are sent as an MMS message.

4. A method according to any preceding claim in which the first processing apparatus periodically sends a message via the second network re-authenticating the log-on to the application.

5. A method according to any preceding claim in which the second processing apparatus is a server.

6. A method according to any preceding claim wherein the first and second networks differ by virtue of a lack of identity in regard to at least one characteristic selected from the group consisting of:

i. commercial control of access to a least part thereof;

ii. at least one communication protocol employed therein;

iii. transmission medium for data over at least a part thereof; and

iv. intrinsically available frequency bandwidth for transmission of data over at least part thereof.

7. A system comprising at least a first processing apparatus which is capable of being connected, by a first network and a second network connection, to at least one second processing apparatus running an application to which access is gained from the first processing apparatus, the system being arranged to allow the first processing apparatus to initiate a log-on to the application by sending a log on request to the application on the second processing apparatus, the second processing apparatus being arranged to generate a demand for authentication data in response to the request and transmit the demand to the first processing apparatus and the first processing apparatus being arranged to transmit a reply to the demand including the authentication data to the second apparatus; wherein the system is arranged such that at least one of the log-on request, the demand and the reply to the demand are sent via the second network.

8. A processing apparatus running an application onto which users can log-on and comprising a first transmitting means and a first receiving means arranged respectively to transmit and receive data across a first network, a second transmitting means and a second receiving means arranged respectively to transmit and receive data across a second network, different from the first network, and a processing means, at least one of the receiving means being arranged to receive a request to log-on to the application and pass the request to the processing means, the processing means being arranged to cause at least one of the transmitting means to transmit a demand for authentication data and at least one of the receiving means being arranged to receive a reply to the demand which is

arranged to forward the reply to the processing means which is arranged to determine whether the authentication data has been supplied in the reply and to authenticate the log-on request accordingly; wherein at least one of the request, the demand and the response are sent using the second network.

9. An apparatus according to claim 8 in which the first transmitting means and first receiving means are arranged to communicate with the Internet.

10. An apparatus according to claim 8 or 9 in which the second transmitting means and the second receiving means are arranged to communicate with a wireless telecommunication network.

11. An apparatus according to any of claims 8 to 10 in which at least one of the demand and the reply are sent as an MMS message.

12. A method of establishing access from a first processing apparatus to an application running on a second processing apparatus wherein the second apparatus is capable of being connected to a first network and a second network, the method comprising receiving a request to log-on to the application from at least one of the first and second networks, sending a demand for authentication data via at least one of the first and second networks and receiving a reply to the demand containing the authentication data, via at least one of the first and second networks, and processing the authentication data to determine whether it is the demanded authentication data and authenticating the log-on request accordingly; wherein at least one of the request, the demand, and the reply are transmitted using the second network.

13. A processing apparatus arranged to generate a request to initiate a log-on with an application capable of being connected thereto via at least a first and a second network wherein the apparatus is arranged to generate a log-on request and transmit the request across at least one of the first and second networks, further arranged to receive a demand for authentication data in response to the request from at least one of the first and second networks, further arranged to process the demand and to generate a reply thereto containing the authentication data and further arranged to send the reply across at least one of the first and second networks; wherein the apparatus is arranged such that at least one of the request, the demand, and the reply are transmitted using the second network.

14. A method of establishing access to an application running on a processing apparatus from a first processing apparatus and capable of being connected to the application by a first and a second networks comprising generating a request to log-on to the application and transmitting the request across at least one of the networks; receiving a demand for authentication data in response to the request from at least one of the first and second networks ; generating a reply to the demand including the authentication data and sending the reply across at least one of the first and second networks; wherein at least one of the request, the demand and the reply are transmitted using the second network.

15. A computer readable medium containing instructions which when read onto a computer cause that processing apparatus to perform the method of any one of claims 1, 12 or 14.

16. A computer readable medium containing instructions which when read onto a computer cause that computer to function as the processing apparatus of the 7, 8 or 13.

17. A processing apparatus substantially as described and as illustrated herein with reference to the accompanying drawings.

18. A method of authenticating a log-on request to an application substantially as described herein and as illustrated herein with reference to the accompanying drawings.

19. A method of authenticating a log-on to an application running on a processing apparatus comprising causing the processing apparatus to send a demand for authentication data to a second processing apparatus and further requiring receipt of the authentication data from one of the processing apparatus and the second processing apparatus; and if the authentication data meets predetermined criteria authenticating the log-on to the processing apparatus.

20. A method according to claim 19 in which the demand is sent via an MMS message.

21. A method of establishing access to an application running on a processing apparatus comprising the following steps:

i. making an access request to an access requesting means for receiving and processing the access request;

ii. causing the access requesting means to process the request and cause a demand for authentication data to be generated requesting predetermined authentication data and to be sent to a verifying means for receiving the demand and allow a user thereof to verify the request;

iii. causing the verifying means to send a reply to the demand containing information; and

iv. receiving and processing the reply and determining whether the request to access the processing means should be granted by determining whether the data contained in the reply is, or substantially is, the authentication data.

22. A method according to claim 21 in which the access receiving means and the verifying means are provided on a single processing apparatus.

23. A method according to claim 21 in which the access receiving means and the verifying means are provided on different processing apparatus.

24. A method according to any claims 21 to 23 in which the processing apparatus to which it is desired to gain access is remote from the access requesting means.

25. A method according to claim 24 in which the processing apparatus is connected to the access requesting means via a network connection.

26. A method according to claim 25 in which the network connection is an Internet connection.

27. A method according to claim 25 or 26 in which the verifying means is connected to the processing apparatus onto which it is desired to gain access via a second network.

28. A method according to any of claims 21 to 23 in which processing apparatus to which it is desired to gain access comprises the access requesting means.

29. A method according to any of claims 21 to 28 in which at least one of the following group: the access request; the demand; the reply are sent over a first network connection and at least one of the group is sent over a second network connection.

30. A method according to any of claim 29 in which the first and second network connections differ from each other by virtue of a lack of identity in regard to at least one characteristic selected from the group consisting of:

i. commercial control of access to a least part thereof;
ii. at least one communication protocol employed therein;
iii. transmission medium for data over at least a part thereof; and
iv. intrinsically available frequency bandwidth for transmission of data over at least part thereof.

31. A method according to any of claims 21 to 30 in which at least one of the following group: the access request, the demand; the reply comprise an MMS message.

32. A method according to any of claims 21, 22 or 24 to 31 in which the log-on request and the reply to the demand are both sent by the same processing apparatus.

33. A method according to any of claims 21 or 23 to 32 in which the log-on request is sent by a second processing apparatus acting as a proxy for another.

ABSTRACT

METHOD OF AUTHENTICATING A LOG-ON REQUEST AND RELATED APPARATUS

A method of establishing access from a first processing apparatus (300) to an application running on a second processing apparatus (100) comprising the steps of: sending, on behalf of the first processing apparatus (300), a log-on request to the second processing apparatus (100) via a first network (6); responding to the log-on request with a demand for authentication data; and replying to the demand by sending the authentication data; wherein at least one of the demand and the authentication data are sent via a second network (308), different to the first.

To be accompanied, when published, by Figure 2 of the drawings.

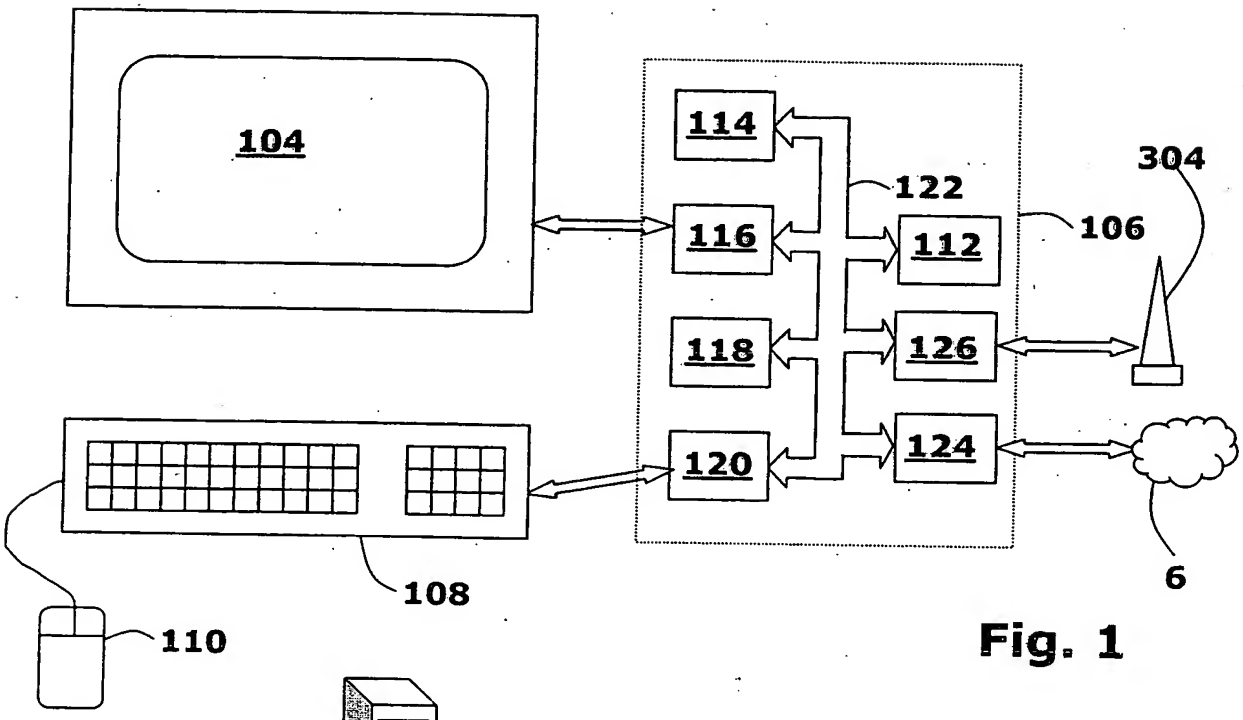
104
114
116
118
120
122
112
126
124
106
304
108
110
6

Fig. 1

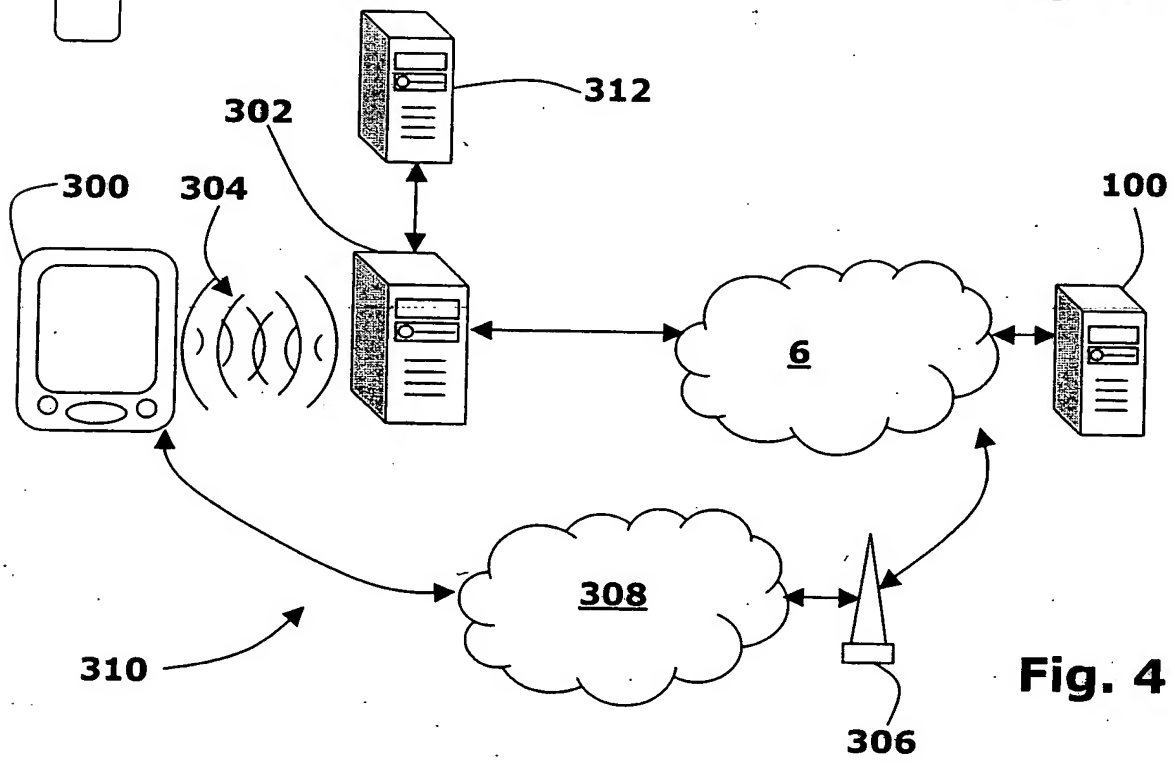
312
302
300
304
100
6
308
310
306

Fig. 4

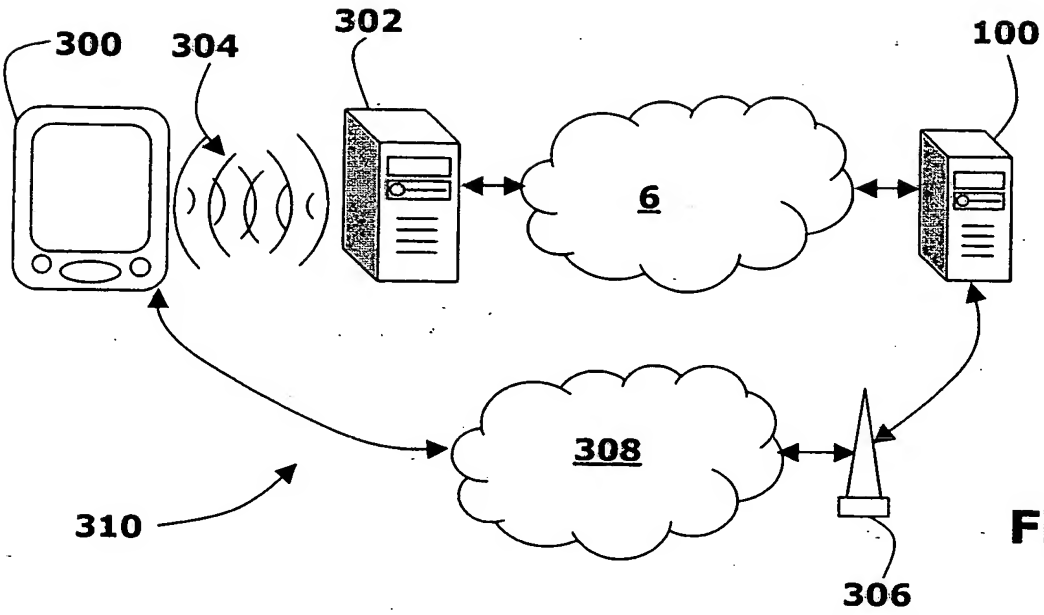

Fig. 2

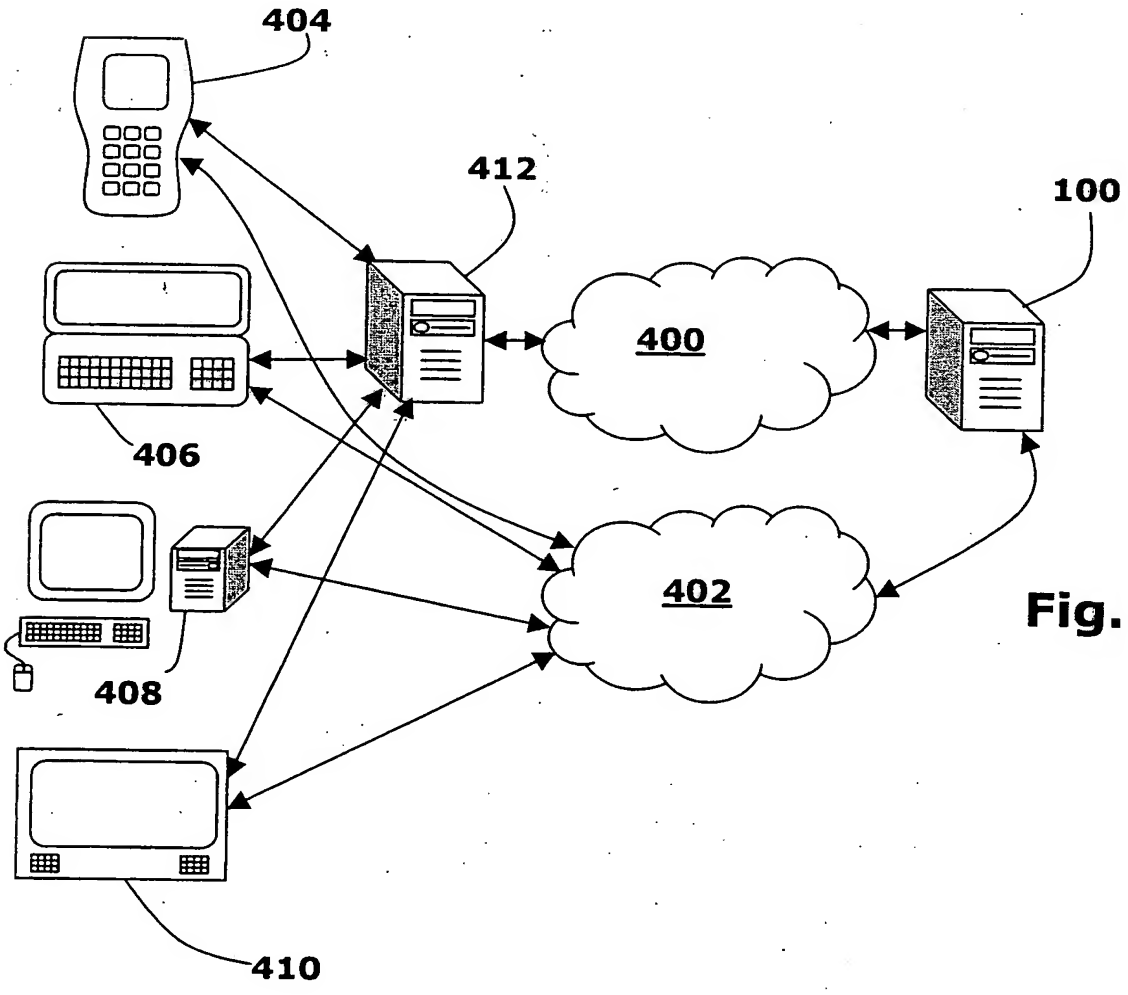

Fig. 3

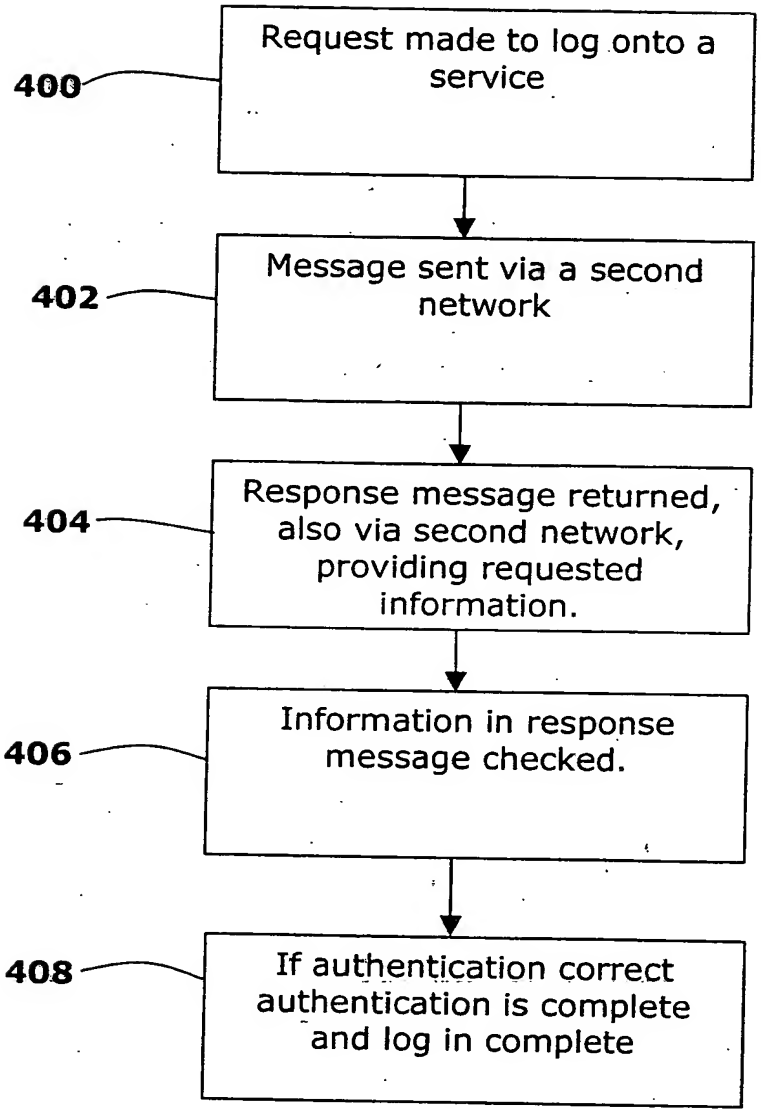
400
Request made to log onto a service
402
Message sent via a second network
404
Response message returned, also via second network, providing requested information.
406
Information in response message checked.
408
If authentication correct authentication is complete and log in complete

Fig. 5

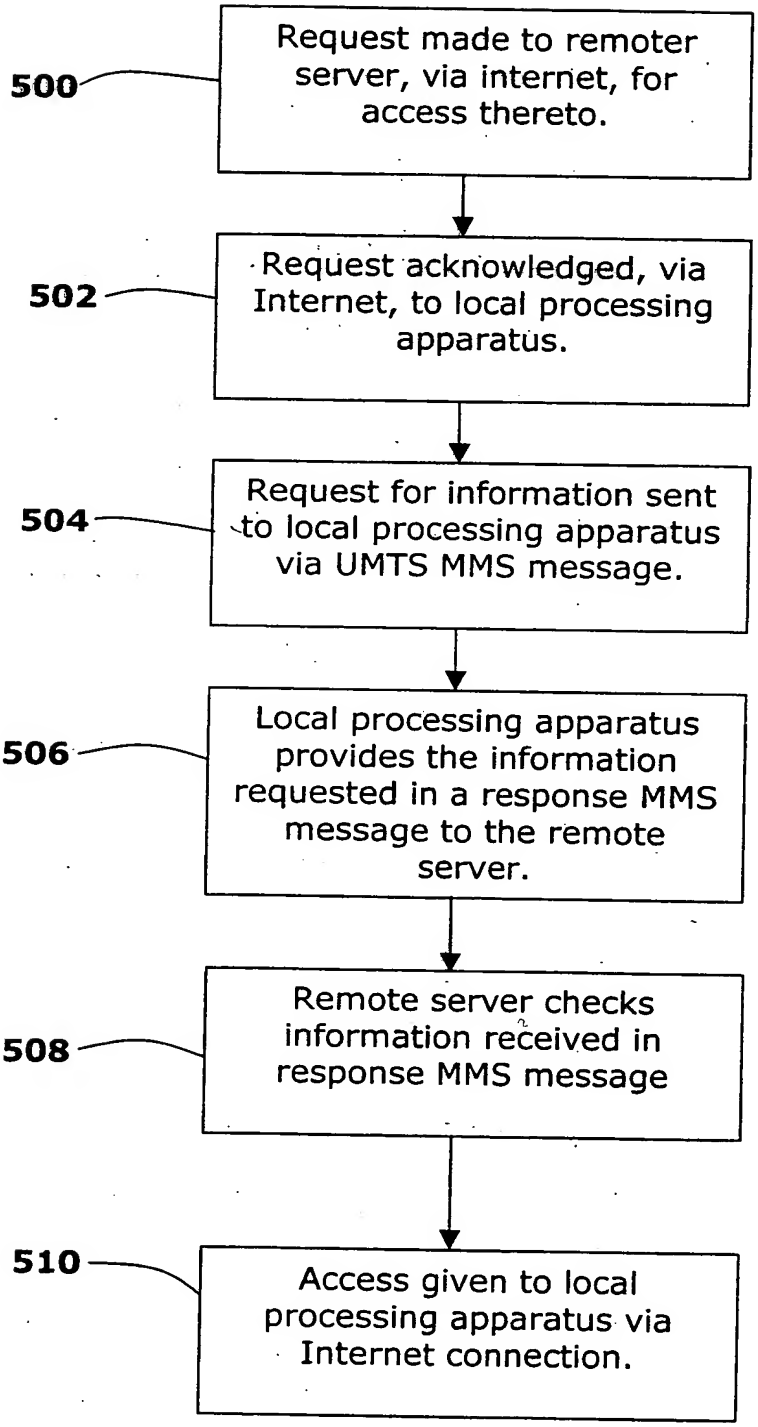
500
Request made to remoter server, via internet, for access thereto.
502
Request acknowledged, via Internet, to local processing apparatus.
504
Request for information sent to local processing apparatus via UMTS MMS message.
506
Local processing apparatus provides the information requested in a response MMS message to the remote server.
508
Remote server checks information received in response MMS message
510
Access given to local processing apparatus via Internet connection.

Fig. 6

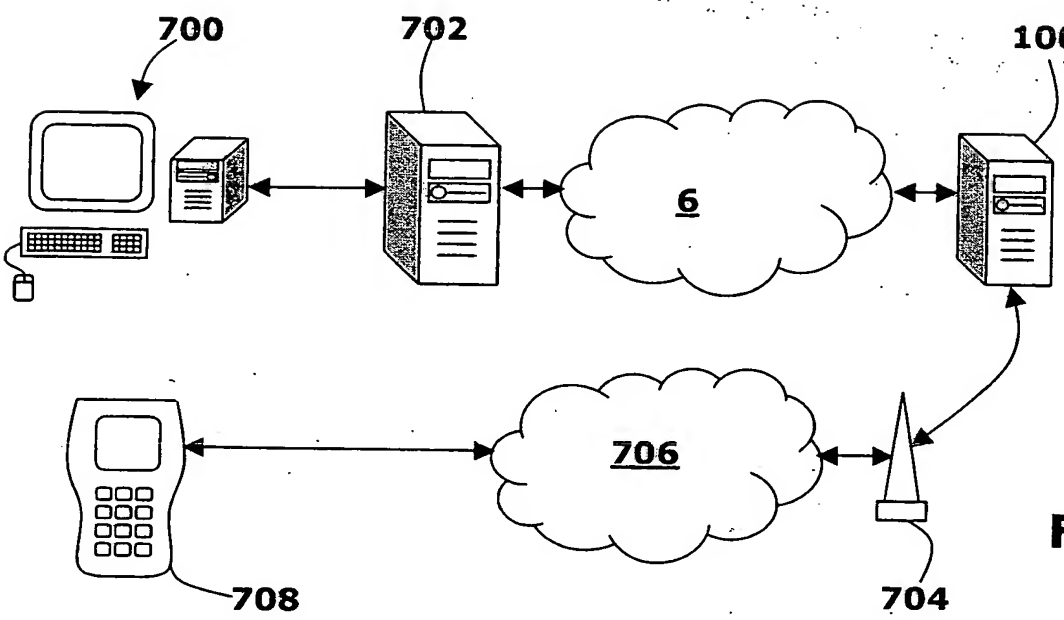

Fig. 7